

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:

encoding means for executing predetermined  
sequence transformation for an input image and

5 bit-plane-encoding an obtained transform coefficient;

storing means for storing encoded data obtained  
by said encoding means;

recognition means for recognizing a first image  
quality of the image to be displayed by a predetermined

10 display device;

output means for reading out, from said storing  
means, data necessary to reconstruct an image having a  
predetermined image quality in the encoded data and  
outputting the data;

15 decoding means for decoding the output encoded  
data; and

adjustment means for adjusting the image decoded  
by said decoding means to make an image quality of the  
image match the first image quality,

20 wherein said recognition means instructs said  
output means to read out encoded data corresponding to  
a decoded image having a second image quality in the  
held encoded data on the basis of a predetermine  
condition, and

25 said adjustment means adjusts the image obtained  
by decoding, by said decoding means, the encoded data  
output by said output means, to make an image quality

of the image to be displayed by said display device match the first image quality.

2. The apparatus according to claim 1, wherein said adjustment means adjusts an image output on the basis of a difference between the first image quality recognized by said recognition means and the second image quality obtained by said decoding means to make an image quality of the image match the first image quality.

10 3. The apparatus according to claim 1, wherein the first image quality is the resolution of the image to be displayed.

15 4. The apparatus according to claim 1, wherein the second image quality is a resolution  $2 \times 2$  times that of the image to be displayed.

5. The apparatus according to claim 1, wherein the second image quality is a resolution not less than  $2 \times 2$  times that of the image to be displayed.

20 6. The apparatus according to claim 1, wherein an image having a resolution equal to or higher than the resolution is an image having a resolution equal to or lower than a highest resolution displayable by the encoded data held by said storing means.

25 7. The apparatus according to claim 4, wherein the encoded data output by said output means corresponds to all or some data of each bit plane generated by the bit-plane-encoding in the encoded data corresponding to

the second image quality.

8. The apparatus according to claim 5, wherein the encoded data output by said output means corresponds to all or some data of each bit plane generated by the bit-plane-encoding in the encoded data corresponding to the second image quality.

9. The apparatus according to claim 6, wherein the encoded data output by said output means corresponds to all or some data of each bit plane generated by the bit-plane-encoding in the encoded data corresponding to the second image quality.

10. The apparatus according to claim 1, wherein the sequence transformation is discrete wavelet transformation.

11. The apparatus according to claim 1, wherein in decoding the encoded data corresponding to the second image quality, said decoding means stops decoding at a predetermined bit plane for encoded data which is not related to the first image quality.

12. The apparatus according to claim 1, wherein said decoding means receives encoded data obtained by segmenting the image to be encoded into at least one rectangular region and independently encoding the rectangular region and sequentially outputs a partial image corresponding to the rectangular region.

13. The apparatus according to claim 1, wherein said encoding means outputs encoded data obtained by

segmenting the received image into at least one rectangular region and independently encoding the rectangular region.

14. The apparatus according to claim 1, wherein said  
5 recognition means instructs said output means to output a code sequence related to the first image quality for a predetermined rectangular region in the code sequence independently encoded in units of rectangular regions and to output a code sequence related to the second  
10 image quality for remaining rectangular regions.

15. The apparatus according to claim 1, wherein said  
output means outputs a code sequence related to the first image quality for a predetermined rectangular region in the code sequence independently encoded in  
15 units of rectangular regions and outputs a code sequence related to the second image quality for remaining rectangular regions.

16. An image processing method comprising:  
the encoding step of executing predetermined  
20 sequence transformation for an input image and bit-plane-encoding an obtained transform coefficient;  
the step of storing encoded data obtained in the encoding step in storage means;  
the recognition step of recognizing a first image  
25 quality of the image to be displayed by a predetermined display device;  
the output step of reading out, from the storage

means, data necessary to reconstruct an image having a predetermined image quality in the encoded data and outputting the data;

the decoding step of decoding the output encoded  
5 data; and

the adjustment step of adjusting the image decoded in the decoding step to make an image quality of the image match the first image quality,

wherein the output step comprises the step of  
10 reading out encoded data corresponding to a decoded image having a second image quality in the held encoded data on the basis of a predetermine condition, and

the adjustment step comprises the step of  
adjusting the image obtained by decoding, in the  
15 decoding step, the encoded data output in the output step, to make an image quality of the image to be displayed by the display device match the first image quality.

17. A program wherein  
20 said program causes a computer to function as  
encoding means for executing predetermined  
sequence transformation for an input image and  
bit-plane-encoding an obtained transform coefficient;  
storing means for storing encoded data obtained  
25 by said encoding means;

recognition means for recognizing a first image quality of the image to be displayed by a predetermined

display device;

output means for reading out, from said storing means, data necessary to reconstruct an image having a predetermined image quality in the encoded data and

5 outputting the data;

decoding means for decoding the output encoded data; and

adjustment means for adjusting the image decoded by said decoding means to make an image quality of the

10 image match the first image quality,

wherein said recognition means instructs said output means to read out encoded data corresponding to a decoded image having a second image quality in the held encoded data on the basis of a predetermine

15 condition, and

said adjustment means adjusts the image obtained by decoding, by said decoding means, the encoded data output by said output means, to make an image quality of the image to be displayed by said display device

20 match the first image quality.

18. An image processing apparatus comprising an encoding section and a decoding section,

said encoding section comprising

means for encoding an input image to generate

25 encoded data,

means for receiving a designation of an image quality for display of the input image, and

means for outputting, of the encoded data,  
encoded data necessary to display the input image at an  
image quality equal to or higher than the designated  
image quality, and

5       said decoding section comprising

means for decoding the encoded data output from  
said encoding section to generate image data, and

means for, when an image based on the image data  
has an image quality higher than the designated image  
10       quality, converting the image data into image data  
having the designated image quality.

19.   An image processing apparatus comprising:

means for encoding an image to generate encoded  
data;

15       means for receiving a designation of an image  
quality for display of the image; and

means for outputting, of the encoded data,  
encoded data necessary to display the image at an image  
quality equal to or higher than the designated image  
20       quality.

20.   An image processing apparatus for decoding  
encoded data output from an encoding device for  
encoding an image, comprising:

means for designating an image quality of the  
25       image for the encoding device;

means for decoding the encoded data output from  
the encoding device to generate image data; and

means for, when an image based on the image data has an image quality higher than the designated image quality, converting the image data into image data having the designated image quality.

- 5 21. An image processing method comprising the encoding step and the decoding step,

the encoding step comprising the steps of  
encoding an input image to generate encoded data,  
receiving a designation of an image quality for

- 10 display of the input image, and

outputting, of the encoded data, encoded data  
necessary to display the input image at an image  
quality equal to or higher than the designated image  
quality, and

- 15 the decoding step comprising the steps of  
decoding the encoded data output from an encoding  
section to generate image data, and

- when an image based on the image data has an  
image quality higher than the designated image quality,  
20 converting the image data into image data having the  
designated image quality.

22. An image processing method comprising the steps  
of:

encoding an image to generate encoded data;

- 25 receiving a designation of an image quality for  
display of the image; and

outputting, of the encoded data, encoded data



necessary to display the image at an image quality equal to or higher than the designated image quality.

23. An image processing method of decoding encoded data output from an encoding device for encoding an

5 image, comprising the steps of:

designating an image quality of the image for the encoding device;

decoding the encoded data output from the encoding device to generate image data; and

10 when an image based on the image data has an image quality higher than the designated image quality, converting the image data into image data having the designated image quality.

24. A program wherein

15 said program causes a computer to function as an encoding section and a decoding section,

said encoding section comprising means for encoding an input image to generate encoded data,

20 means for receiving a designation of an image quality for display of the input image, and

means for outputting, of the encoded data, encoded data necessary to display the input image at an image quality equal to or higher than the designated

25 image quality, and

said decoding section comprising means for decoding the encoded data output from

said encoding section to generate image data, and

means for, when an image based on the image data has an image quality higher than the designated image quality, converting the image data into image data having the designated image quality.

25. A program which causes a computer to function as:  
means for encoding an image to generate encoded data;

means for receiving a designation of an image quality for display of the image; and

means for outputting, of the encoded data, encoded data necessary to display the image at an image quality equal to or higher than the designated image quality.

26. A program which, to decode encoded data output from an encoding device for encoding an image, causes a computer to function as:

means for designating an image quality of the image for the encoding device;

means for decoding the encoded data output from the encoding device to generate image data; and

means for, when an image based on the image data has an image quality higher than the designated image quality, converting the image data into image data having the designated image quality.

27. An image processing apparatus for encoding an image and outputting encoded data, comprising:

determination means for determining a type of the image;

encoding means for executing encoding including discrete wavelet transformation for the image to

5 generate the encoded data of the image;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the encoded data; and

output means for outputting, of the generated  
10 encoded data, data necessary to generate the decoded image having the input resolution,

wherein for a specific type of image, said output means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher  
15 than the input resolution.

28. An image processing apparatus for encoding an image and outputting encoded data, comprising:

means for segmenting the image into a plurality of regions of a predetermined unit;

20 determination means for determining a type of each of the segmented images;

encoding means for executing encoding including discrete wavelet transformation for each of the segmented images to generate the encoded data of each  
25 of the images;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the

encoded data; and

output means for outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

- 5            wherein for the region corresponding to a specific type of image, said output means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

- 10        29.    The apparatus according to claim 28, wherein as the input of the resolution, only an input of a resolution corresponding to a resolution that can be composited from subbands by the discrete wavelet transformation is received.

- 15        30.    The apparatus according to claim 29, wherein for the region corresponding to a specific type of image, said output means outputs, of the encoded data, data related to a subband necessary to generate the decoded image having a resolution higher than the input  
20        resolution.

31.    The apparatus according to claim 27, wherein said determination means determines at least whether the image is an image containing text, and the specific type of image includes the image containing the text.

- 25        32.    The apparatus according to claim 28, wherein said determination means determines at least whether the image is an image containing text, and the specific

type of image includes the image containing the text.

33. The apparatus according to claim 28, wherein the region is a rectangular tile.

34. The apparatus according to claim 27, wherein said  
5 encoding means executes the discrete wavelet transformation and then executes quantization and entropy encoding.

35. The apparatus according to claim 28, wherein said  
10 encoding means executes the discrete wavelet transformation and then executes quantization and entropy encoding.

36. An image processing apparatus for decoding the encoded data output by said image processing apparatus of claim 28, wherein

15 for the region corresponding to the specific type of image, the decoded image is formed at a resolution higher than that of the remaining regions.

37. The apparatus according to claim 36, comprising  
20 means for converting the decoded image in the region corresponding to the specific type of image into an image having the same resolution as that of a decoded image in the remaining regions.

38. An image processing apparatus for encoding an image and outputting encoded data, comprising:

25 first encoding means for segmenting the image into a plurality of subbands by discrete wavelet transformation;

means for segmenting an image of each subband into regions of a predetermined unit;

determination means for determining a type of the image of each region;

- 5 second encoding means for executing quantization and entropy encoding for the image of each region to generate encoded data of each region;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the

- 10 encoded data; and

output means for outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

- 15 wherein for a specific type of image, said output means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

39. An image processing apparatus for decoding the encoded data output by said image processing apparatus  
20 of claim 38, wherein

for the region corresponding to the specific type of image, the decoded image is formed at a resolution higher than that of the remaining regions.

40. The apparatus according to claim 39, wherein  
25 said apparatus further comprises

means for forming a first decoded image having the resolution, and

means for forming a second decoded image on the basis of the encoded data of the region corresponding to the specific type of image, and

the region corresponding to the specific type of  
5 image forms a decoded image having a resolution higher than that of remaining regions by compositing the first and second decoded images.

41. An image processing apparatus for encoding an image and outputting encoded data, comprising:

10 means for segmenting the image into a plurality of regions of a predetermined unit;

determination means for determining a type of each of the segmented images;

15 encoding means for executing encoding including discrete wavelet transformation for each of the segmented images to generate the encoded data of each of the images;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the  
20 encoded data; and

output means for outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

25 wherein for the region corresponding to a specific type of image, said output means additionally outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher

than the input resolution.

42. An image processing method of encoding an image and outputting encoded data, comprising:

the determination step of determining a type of  
5 the image;

the encoding step of executing encoding including discrete wavelet transformation for the image to generate the encoded data of the image;

the step of receiving an input of a resolution of  
10 a decoded image, which is to be used upon decoding the encoded data; and

the output step of outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

15 wherein the output step comprises the step of, for a specific type of image, outputting, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

20 43. An image processing method of encoding an image and outputting encoded data, comprising:

the step of segmenting the image into a plurality of regions of a predetermined unit;

25 the determination step of determining a type of each of the segmented images;

the encoding step of executing encoding including discrete wavelet transformation for each of the



segmented images to generate the encoded data of each of the images;

the step of receiving an input of a resolution of a decoded image, which is to be used upon decoding the  
5 encoded data; and

the output step of outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

wherein the output step comprises the step of,  
10 for the region corresponding to a specific type of image, outputting, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

44. An image processing method of decoding the  
15 encoded data output by said image processing method of claim 43, wherein

for the region corresponding to the specific type of image, the decoded image is formed at a resolution higher than that of the remaining regions.

20 45. An image processing method of encoding an image and outputting encoded data, comprising:

the first encoding step of segmenting the image into a plurality of subbands by discrete wavelet transformation;

25 the step of segmenting an image of each subband into regions of a predetermined unit;

the determination step of determining a type of

the image of each region;

the second encoding step of executing quantization and entropy encoding for the image of each region to generate encoded data of each region;

- 5 the step of receiving an input of a resolution of a decoded image, which is to be used upon decoding the encoded data; and

the output step of outputting, of the generated encoded data, data necessary to generate the decoded

- 10 image having the input resolution,

wherein the output step comprises, for a specific type of image, outputting, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

- 15 46. An image processing method of decoding the encoded data output by said image processing method of claim 45, wherein

for the region corresponding to the specific type of image, the decoded image is formed at a resolution

- 20 higher than that of the remaining regions.

47. An image processing method of encoding an image and outputting encoded data, comprising:

the step of segmenting the image into a plurality of regions of a predetermined unit;

- 25 the determination step of determining a type of each of the segmented images;

the encoding step of executing encoding including

discrete wavelet transformation for each of the segmented images to generate the encoded data of each of the images;

the step of receiving an input of a resolution of  
5 a decoded image, which is to be used upon decoding the encoded data; and

the output step of outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

10 wherein the output step comprises the step of, for the region corresponding to a specific type of image, additionally outputting, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

15 48. A program wherein

to encode an image to output encoded data, said program causes a computer to function as:

determination means for determining a type of the image;

20 encoding means for executing encoding including discrete wavelet transformation for the image to generate the encoded data of the image;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the

25 encoded data; and

output means for outputting, of the generated encoded data, data necessary to generate the decoded

image having the input resolution,

wherein for a specific type of image, said output means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

49. A program wherein

to encode an image to output encoded data, said program causes a computer to function as:

means for segmenting the image into a plurality of regions of a predetermined unit;

determination means for determining a type of each of the segmented images;

encoding means for executing encoding including discrete wavelet transformation for each of the segmented images to generate the encoded data of each of the images;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the encoded data; and

output means for outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

wherein for the region corresponding to a specific type of image, said output means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

50. A program wherein

to decode encoded data output by causing a computer to execute said program of claim 49, said program causes the computer to function as:

5 means for, for the region corresponding to the specific type of image, forming the decoded image at a resolution higher than that of the remaining regions.

51. A program wherein

to encode an image to output encoded data, said  
10 program causes a computer to function as:

first encoding means for segmenting the image into a plurality of subbands by discrete wavelet transformation;

means for segmenting an image of each subband  
15 into regions of a predetermined unit;

determination means for determining a type of the image of each region;

second encoding means for executing quantization and entropy encoding for the image of each region to  
20 generate encoded data of each region;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the encoded data; and

output means for outputting, of the generated  
25 encoded data, data necessary to generate the decoded image having the input resolution,

wherein for a specific type of image, said output

means outputs, of the encoded data, data necessary to generate the decoded image having a resolution higher than the input resolution.

52. A program wherein

5 to decode encoded data output by causing a computer to execute said program of claim 51, said program causes the computer to function as:

means for, for the region corresponding to the specific type of image, forming the decoded image at a  
10 resolution higher than that of the remaining regions.

53. A program wherein

to encode an image to output encoded data, said program causes a computer to function as:

means for segmenting the image into a plurality  
15 of regions of a predetermined unit;

determination means for determining a type of each of the segmented images;

encoding means for executing encoding including discrete wavelet transformation for each of the  
20 segmented images to generate the encoded data of each of the images;

means for receiving an input of a resolution of a decoded image, which is to be used upon decoding the encoded data; and

25 output means for outputting, of the generated encoded data, data necessary to generate the decoded image having the input resolution,

wherein for the region corresponding to a  
specific type of image, said output means additionally  
outputs, of the encoded data, data necessary to  
generate the decoded image having a resolution higher  
5 than the input resolution.